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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/560,632	12/13/2005	Robert-Paul Mario Berretty	NL 030666	6818

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P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER	
DRENNAN, BARRY T	

ART UNIT	PAPER NUMBER
4133	

MAIL DATE	DELIVERY MODE
09/08/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/560,632	BERRETTY ET AL.	
	Examiner	Art Unit	
	Barry Drennan	4133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/05/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. This application claims priority as a national stage application under the Patent Cooperation Treaty, with effective filing date June 6, 2004, and claims foreign priority of application EP 03101.747.8 filed in the European Patent Office on June 16, 2003.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: Method and apparatus of image segmentation using signs of curvature values, low-pass filtering, and segment growth.

3. The specification is objected to because of the lack of section headings throughout.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.

(1) Field of the Invention.
(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

4. The disclosure is objected to because of the following informalities: Page 3 contains an extra appearance of the phrase, "Figure 1 shows an image processing system," followed by unnecessary whitespace.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Gordon, G.G., "Face recognition based on depth maps and surface curvature," Geometric Methods in Computer Vision, SPIE Vol. 1570, pp. 234-247 (1991, hereinafter Gordon).

7. With respect to claim 1, Gordon discloses an image processing method comprising segmentation of an image, said segmentation comprising the steps of:

computing, for respective pixel locations in the image, information about signs of curvature values of an intensity of the image as a function of pixel location (equations 1, 2, and 3 on pages 236-237);

assigning pixel locations to different segments, each according to one or more, or a combination of the signs for the pixel location ("Segmentation by sign of Gaussian and mean curvature is very straightforward... Figure 2 shows the resulting regions for three different sample faces," page 238).

8. With respect to claim 2, Gordon discloses an image processing method according to Claim 1, comprising assigning each pixel location to respective different type of segments according to whether the signs of the curvature values in two mutually transverse directions at the pixel location are both positive or both negative respectively ("Four kinds of regions are produced: K+,H+ are convex, K+,H- are concave...," page 237, where K and H represent the Gaussian and mean curvatures, which are the determinant and trace, respectively, of the Hessian of the image in Cartesian coordinates, or the shape operator matrix in cylindrical coordinates. While Gordon performs these calculations in cylindrical coordinates and the instant application uses Cartesian coordinates, the representations are mathematically equivalent. The signs of K and H indicate indirectly the signs of the curvature in the x and y directions, as claimed in the instant invention).

9. With respect to claim 3, Gordon discloses an image processing method according to Claim 1, comprising spatially low pass filtering the intensity prior to said computing and computing the information about the sign of curvature from the low pass

filtered intensity ("...we precompute curvature values using several different levels of smoothing," page 238, where smoothing constitutes a method of low-pass filtering).

10. With respect to claim 4, Gordon discloses an image processing method according to Claim 3, comprising selecting a bandwidth of said low pass filtering adaptive to a content of the image ("We then use prior knowledge of the face structure and its expected local curvature to select curvature values from the precomputed set with the most locally appropriate smoothing level," page 238).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gordon as applied to claim 1 above, and further in view of Martinez-Perez, et al., "Retinal blood vessel segmentation by means of scale-space analysis and region growing," Medical Image Computing and Computer-Assisted Intervention (MICCAI '99), Lecture Notes in Computer Science Vol. 1679, pp. 90-97 (1999, hereinafter Martinez-Perez).

13. With respect to claim 5, Gordon does not discuss the use of region-growing segmentation techniques. However, Martinez-Perez discloses a region-growing technique conditioned on the amplitude of curvature values ("An unlabelled pixel is classified as belonging to class *i* if it fulfills a specific condition... For the first stage, the

condition for class *vessel* is [an equation dependent upon the local maximum principal curvature]...", page 94).

Therefore, it would have been obvious to one ordinarily skilled in the art at the time the invention was made to combine the region-growing technique of Martinez-Perez with the method of Gordon, because as Martinez-Perez teaches, the region-growing technique taught therein can "overcome[] the problem of variations in contrast inherent in [some] images".

14. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gordon in view of Bloomberg, US Patent 5,202,933, issued April 13, 1993 (hereinafter Bloomberg).

15. With respect to claims 6-8, Gordon teaches the method accomplished by the apparatus claimed in the instant invention (comprising the computation of information about signs of curvature values of an intensity of the image as a function of pixel location, the assignment of pixel locations by the signs of the pixel locations and in particular by the signs both being either positive or negative, and filtering the intensity values prior to calculation of curvature values), but provides no structure for the apparatus.

However, Bloomberg teaches that segmentation methods can be accomplished by instantiating them in "a general purpose computer, a special purpose computer optimized for image processing operations, or a combination of a general purpose computer and auxiliary special purpose hardware" (col. 5, lines 57-62).

Therefore, It would have been obvious to one ordinarily skilled in the art at the time the invention was made to instantiate the method of Gordon in the apparatus of Bloomberg, because it is well-known in the art that in addition to providing facilities for image segmentation, a general purpose computer also provides facilities for capture, manipulation, viewing, and storage of images before and after segmentation.

16. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gordon and Bloomberg as applied to claim 8 above, and further in view of Cheng, et al., "Color images segmentation using scale space filter and Markov random field," Intelligent Robots and Computer Vision X: Algorithms and Techniques, SPIE Vol. 1607, pp. 358-368 (1991, hereinafter Cheng).

17. With respect to claims 9 and 10, Gordon describes the use of a smoothing technique before segmentation commences, which is a method of low-pass filtering. However, neither Gordon nor Bloomberg describe adapting the low-pass filtering bandwidth to "a count of selected segments" or "a size of selected segments".

However, Cheng discloses a method of adjusting the filter bandwidth to moderate the number and size of peaks and valleys in the image histogram, and discusses the shrinking and disappearance of segments as the filter bandwidth is increased ("As we sweep across the apex of an arch, with sigma increasing, the pair [of zero-crossing contours] approaches each other with increasing velocity, then collide and are annihilated," page 365).

Therefore, it would have been obvious to one ordinarily skilled in the art at the time the invention was made to combine the apparatus taught by Gordon and Bloomberg (combined) with the method of adaptive filtering taught by Cheng, because otherwise, "the curves of most histograms are not smooth and they contain many rugged peaks, [and so] the computer cannot analyze the curve effectively" (Cheng, page 365).

18. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gordon and Bloomberg as applied to claim 6 above, and further in view of Martinez-Perez (above).

19. With respect to claim 11, neither Gordon nor Bloomberg discuss the use of region-growing segmentation techniques. However, Martinez-Perez discloses a region-growing technique conditioned on the amplitude of curvature values ("An unlabelled pixel is classified as belonging to class *i* if it fulfills a specific condition... For the first stage, the condition for class *vessel* is [an equation dependent upon the local maximum principal curvature]…", page 94).

Therefore, it would have been obvious to one ordinarily skilled in the art at the time the invention was made to combine the region-growing technique of Martinez-Perez with the method of Gordon, because as Martinez-Perez teaches, the region-growing technique taught therein can "overcome[] the problem of variations in contrast inherent in [some] images".

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barry Drennan whose telephone number is 571-270-7262. The examiner can normally be reached on Monday through Thursday and alternate Fridays from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Abul Azad, can be reached on 571-272-7599. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Barry Drennan/
Examiner, Art Unit 4133

/ABUL AZAD/
Supervisory Patent Examiner, Art Unit 4133